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IS : 16 (Part III) - 1974

*Indian Standard*  
SPECIFICATION FOR PLYWOOD TEA-CHEST  
PART III BATTENS  
(*Fourth Revision*)

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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

*Indian Standard*

## SPECIFICATION FOR PLYWOOD TEA-CHEST

## PART III BATTENS

*(Fourth Revision)*

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*Indian Standard*

## SPECIFICATION FOR PLYWOOD TEA-CHEST

## PART III BATTENS

*( Fourth Revision )*

## 0. FOREWORD

**0.1** This Indian Standard (Part III) (Fourth Revision) was adopted by the Indian Standards Institution on 19 February 1974, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** IS : 10-1970\* covers provisions relating to different components of a plywood tea-chest, namely, battens, plywood panels, metal fittings, etc. Besides, it also covers provisions in respect of sizes and testing of assembled tea-chest. Since some of these aspects are the concern of different trades, such as for plywood, battens, metal fittings and to assist the quality enforcement procedures it has been felt that, the fourth revision of IS : 10-1970\* be published in parts. This part deals with battens for plywood tea-chests. Other parts dealing with plywood panels, metal fittings, etc, would be prepared in due course.

**0.2.1** In addition to the requirements already covered under IS : 10-1970\*, this standard specifies certain minimum strength requirements of the battens as determined on full length finished battens.

**0.3** In the formulation of this standard due weightage has been given to the international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

**1. SCOPE**

**1.1** This standard (Part III) covers dimensions, requirements and species of timber suitable for battens for tea-chests.

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\*Specification for plywood tea-chests (*third revision*).

†Rules for rounding off numerical values (*revised*).

## 2. TERMINOLOGY

**2.1** For the purpose of this standard, the definitions given in IS : 707-1968\* and the following shall apply.

**2.1.1 Batten** — A rectangular cross-sectioned piece of timber used in the corners of a tea-chest.

**2.1.2 Checks** — A separation of fibres along the grain which is confined to one face of the batten.

**2.1.3 Insect Holes (Borer Holes)** — A hole caused by the attack of wood boring insects and other organisms.

**2.1.4 Knot** — A branch base or limb embedded in the batten during the natural growth of the tree.

**2.1.5 Split** — A separation of fibres which extends from one face of the batten to another and runs along the grain of the piece.

**2.1.6 Warp** — A deviation or distortion from a true plane of the surface of the batten due to stresses caused by uneven moisture content.

## 3. SPECIES OF TIMBER

**3.1** The battens shall be manufactured from any of the timbers listed in Appendix A, subject to certain species being treated in the manner described therein. The species of timber selected for the manufacture of battens shall have strength properties as required under 7.

NOTE — Only fir and spruce are generally recommended for battens for tea-chests for export purposes.

## 4. DIMENSIONS AND TOLERANCES

### 4.1 Dimensions

**4.1.1** For all sizes of tea-chests (*see* IS : 10-1970†), except tea-chest used for packing instant tea (*see* 4.1.2) the cross section of the battens shall be 2.2 × 2.0 cm subject to the tolerances given under 4.2. The length of a set of 12 battens required for assembling a tea-chest shall be governed by the following :

- a) Four pieces shall be of length =  $H-5.4$  cm
- b) Four pieces shall be of length =  $W-1$  cm
- c) Four pieces shall be of length =  $L-1$  cm

Where L, W and H are the length, width and height of the tea-chest respectively (*see* Fig. 1).

**4.1.1.1** The dimensions of L, W and H, in that order, shall be governed by the overall dimensions, namely, length, width and height of the tea-chest,

\*Glossary of terms applicable to timber and timber products (*first revision*).

†Specification for plywood tea-chests (*third revision*).



in that order, as laid down in IS : 10-1970\*. Where L and W are of the same dimensions eight pieces of battens in a tea-chest shall have the same length [see 4.1.1(b) and 4.1.1(c)].

**4.1.2** The cross section of battens for tea-chest used for packing instant tea — shall be  $2.6 \times 2.6$  cm. The length of a set of 12 battens shall be as follows :

- a) 4 pieces shall be of length = 78.3 cm
- b) 4 pieces shall be of length = 65.8 cm
- c) 4 pieces shall be of length = 35.2 cm

**4.2 Tolerances** — The following tolerances shall be allowed on the various dimensions of the battens :

Length	$\pm 1.5$ mm
Breadth (2.2 cm)	$\pm 1.5$ mm
Thickness (2.0 cm)	$\pm 2.0$ mm

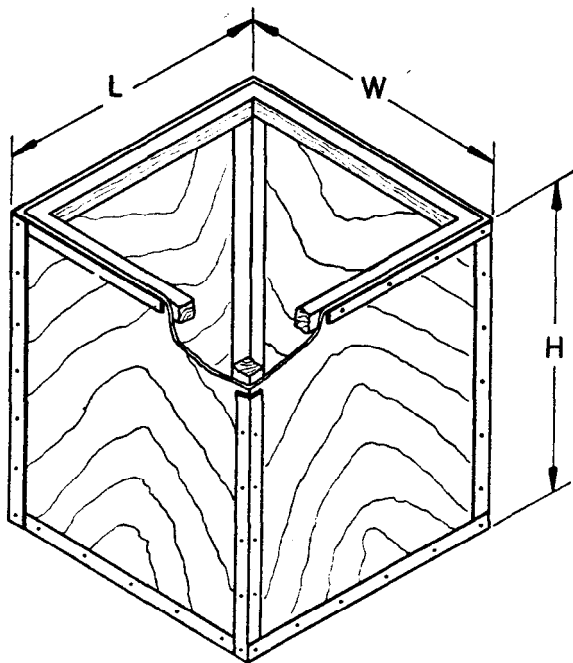


FIG. 1 TEA-CHEST

## 5. REQUIREMENTS

**5.1** Battens shall conform to the provisions mentioned under 5.1.1 to 5.1.3.

\*Specification for plywood tea-chests (third revision).

**5.1.1** Battens shall be free from splits, twist, loose knot, spiral grain and decay. The inclinations of grain shall not exceed 1 in 15.

**5.1.1.1** If a batten with a permissible moisture content and grain deviation is tested on a surface plate, a deviation from straightness up to 2.0 mm at the centre of the batten may be allowed.

**5.1.1.2** *Insect holes* — Live insect holes shall not be permitted. Dead insect holes may be permitted up to a maximum of 2 per batten provided they are only pin holes (that is, maximum dia 2 mm).

**5.1.1.3** *Live knots* — Live knots up to a maximum of 6.5 mm in diameter may be permitted. However, such knots shall not be more than 3 in any batten and shall be away at least 50 mm from any end of the batten and 5 mm from any edge.

**5.1.2** Moisture content of battens shall be determined on small portions approximately 2.5 cm in length taken from mid length portion of each batten and of full cross section by the oven dry procedure given in IS : 1708-1969\*. It shall not exceed 15 percent. The moisture content may also be determined by a calibrated moisture meter provided the same is measured at mid length position of the battens on the centre of one of the broad faces.

**5.1.3** In any one consignment, lots of battens sufficient for at least 100 chests (or all the chests, if the lot is of a smaller quantity) shall be of the same species.

## 6. FINISHING

**6.1** All the battens shall be finished reasonably smooth. The battens for top and bottom shall have the ends mitred across the narrow face (2.0 cm) whereas the corner pieces shall have square ends. However, for tea-chests used for packing instant tea, all battens may be finished with square ends.

## 7. LABORATORY TESTS FOR BATTENS

**7.1 Compression Parallel to Grain** — When tested on full length battens of sizes recommended in 4.1 with the ends properly squared, the maximum compressive load shall be not less than  $\frac{4 \times 10^4}{l}$  kg where  $l$  is the length of the batten of tea-chest in cm.

**7.2 Static Bending** — When tested on full length batten (*see 4.1*) on a span of  $l-4$  cm on central load, the breaking load shall be not less than  $\frac{4 \times 10^3}{l}$  kg where  $l$  is the length of batten of tea-chest in cm.

## 8. SAMPLING

**8.1** The method of drawing representative samples of battens and the criteria for conformity shall be as prescribed in Appendix B.

\*Methods of testing small clear specimens of timber (*first revision*).

## 9. MARKING

**9.1** Battens shall be legibly and indelibly marked with the following :

- a) Manufacturer's name and address or trade-mark, if any; and
- b) Month and year of manufacture.

**9.1.1** Each batten may also be marked with the ISI Certification Mark.

NOTE — The use of ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of ISI Certification Mark may be granted to manufacturers or processors may be obtained from the Indian Standards Institution.

## 10. PACKING AND DELIVERY

**10.1** The battens shall be delivered in a clean and dry condition, and unless otherwise specified, shall be suitably packed accordingly to normal trade practices. The following information shall be given on each package of battens :

- a) Manufacturer's name and address or trade-mark, if any ;
- b) Size and indication whether battens are meant for top and bottom or side of the chest;
- c) Number of battens in the package; and
- d) Month and year of manufacture.

# APPENDIX A

(Clause 3.1)

## TIMBER FOR BATTENS AND THEIR TREATMENT

### A-1. SPECIES OF TIMBERS

**A-1.1** The timber for battens to be used for tea-chests shall be of any of the species listed below :

Sl. No.	BOTANICAL NAME	TRADE NAME	ABBREVIATION
1.	<i>Acrocarpus fraxinifolius</i> Wight et Arn.	mundani	MUN
2.	<i>Adina cordifolia</i> (Roxb.) Hk.f.	haldu	HAL
3.	<i>Albizia lebbeck</i> Benth.	kokko	KOK
4.	<i>Aphanamixis polystachya</i> (Wall.) Parker	pitraj	PIT
5.	<i>Amoora</i> spp.	amari	AMA

Sl. No.	BOTANICAL NAME	TRADE NAME	ABBREVIATION
6.	* <i>Anthocephalus cadamba</i> Miq.	kadam	KAD
7.	<i>Artocarpus chaplasha</i> Roxb.	chaplash	CHP
8.	<i>Artocarpus hirsutus</i> Lamk.	aini	AIN
9.	* <i>Bischofia javanica</i> Blume.	uriam	URI
10.	<i>Canarium sikkimense</i> King (Roxb.)	dhup	—
11.	<i>Calophyllum</i> spp.	poon	POO
12.	<i>Cedrela</i> spp. Roxb.	toon	TOO
13.	<i>Chukrasia tabularis</i> A. Juss.	chickrassy	CHI
14.	* <i>Dillenia</i> spp.	dilenia	DIL
15.	<i>Dipterocarpus macrocarpus</i> Vesque	hollong	HON
16.	<i>Dipterocarpus</i> spp.	gurjan	GUR
17.	<i>Syzygium</i> spp.	jaman	JAM
18.	<i>Garuga pinnata</i> Roxb.	garuga	GAU
19.	* <i>Gmelina arborea</i> Roxb.	gamari	GAM
20.	<i>Holoptelea integrifolia</i> Planch.	kanju	KAN
21.	<i>Hopea</i> spp.	hopea	HOP
22.	<i>Hymenodictyon excelsum</i> Wall.	kuthan	KUT
23.	<i>Lagerstroemia hypoleuca</i> Kurz.	pyinma	PYI
24.	<i>Lagerstroemia lanceolata</i> Wall.	benteak	BEN
25.	* <i>Lannea coromandelica</i> Merr.	jhingan	JHI
26.	<i>Lophopetalum wightianum</i> Arn.	banati	BAN
27.	* <i>Machilus</i> spp.	machilus	MAC
28.	* <i>Mangifera indica</i> Linn.	mango	MAN
29.	<i>Michelia</i> spp.	champ	CHM
30.	<i>Palaquium ellipticum</i> (Dalz.) Engler	pali	PAL
31.	<i>Parishia insignis</i> Hook.f.	red dhup	RDH
32.	<i>Phoebe</i> spp.	bonsum	BON
33.	<i>Picea smithiana</i> Boiss.	spruce	SPR
34.	<i>Pinus roxburghii</i> Sargent	chir	CHR
35.	<i>Pinus wallichiana</i> A. B. Jacks	kail	KAL
36.	<i>Pinus insularis</i> Endl.	khasipin	KPI
37.	<i>Planchonia andamanica</i> King.	red bombwe	RBO
38.	<i>Polyalthia fragrans</i>	nedunar	—
39.	<i>Pterocarpus marsupium</i> Roxb.	bijasal	BIJ
40.	<i>Schima wallichii</i> Korth.	chilauni	CHL
41.	<i>Sideroxylon longepetiolatum</i> King et Prain	lambapatti	LAM
42.	<i>Shorea assamica</i> Dyer	makai	MAK
43.	<i>Terminalia arjuna</i> W. & A.	arjun	ARJ
44.	* <i>Terminalia bellirica</i> (Gaertn.) Roxb.	bahera	BAH
45.	<i>Terminalia bialata</i> Steud (Sapwood)	white chuglam	WCH
46.	<i>Terminalia myriocarpa</i> Heurck et Muell. Arg.	hollock	HOL
47.	<i>Terminalia paniculata</i> Roth.	kindal	KIN
48.	<i>Terminalia procera</i> Roxb.	white bombwe	WBO
49.	* <i>Vateria indica</i> Linn.	vellapine	VEL
50.	<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	mullilam.	MUI
51.	<i>Abies</i> spp.	fir	FIR
52.	<i>Canarium</i> spp.	white dhup	WDH

## A-2. TREATMENT

A-2.1 When timbers marked with asterisk (\*) or sapwood of the other

\*Subject to treatment prescribed under A-2.

timbers in the list are used for battens, the treatment indicated in A-2.1.1 shall be given.

**A-2.1.1** The battens shall be treated in 6 percent zinc chloride, boric acid or borax solution by immersion for two hours in a hot solution at about 60°C followed by immersion in a cold solution of the same chemical for one hour.

## APPENDIX B

(Clause 8.1)

### SAMPLING AND CRITERIA FOR CONFORMITY

#### B-1. SAMPLING

**B-1.1 Lot** — In a consignment all the battens manufactured from a single species of timber under relatively similar conditions of manufacture shall be grouped together to constitute a lot.

**B-1.1.1** Each lot shall be inspected and tested separately for determining its conformity to the requirements of the specification.

#### B-2. SCALE OF SAMPLING

**B-2.1** The number of battens to be selected from a lot shall depend upon the size of the lot and shall be in accordance with the Table 1.

**TABLE 1 SCALE OF SAMPLING**

LOT SIZE	FOR VISUAL AND DIMENSIONAL REQUIREMENTS		FOR LABORATORY TEST
	Sample Size	Acceptance Number	SUB-SAMPLE
(1)	(2)	(3)	(4)
Up to 500	20	1	4
501 „ 1 000	32	2	5
1 001 „ 3 000	50	3	7
3 001 „ 10 000	80	5	10
10 001 „ 35 000	125	7	15
35 001 and above	200	10	20

**B-2.2** The battens for the sample shall be selected at random from the lot. Guidance may be obtained from IS : 4905-1968\* for random selection procedures.

#### B-3. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

**B-3.1 For Visual Defects and Dimensional Requirements** — All the

\*Methods for random sampling.

battens selected according to col 1 and 2 of Table 1 shall be examined for visual defects and inspected for dimensional requirements. Any batten failing to satisfy one or more of the requirements will be termed as defective. The number of all the defective battens shall not exceed the corresponding acceptance number given in col 3 of Table 1, if the lot is to be accepted under this clause.

**B-3.2 Laboratory Tests** — The number of battens to be tested for moisture content (5.1.2), compression parallel to grain (7.1) and static bending (7.2) is given in col 4 of Table 1. These shall be taken at random from those inspected under B-3.1 and found conforming to visual and dimensional requirements.

**B-3.2.1** The individual test results for each batten tested shall be noted and from these test results, the average ( $\bar{X}$ ) and the range ( $R$ ) shall be calculated for each requirement separately as follows :

$$\text{Average } (\bar{X}) = \frac{\text{The sum of test results}}{\text{Number of test results}}$$

$$\text{Range } (R) = \text{The difference between the maximum and the minimum values of the test results.}$$

The conformity of a lot to the requirements of these tests shall be determined as given in Table 2.

**TABLE 2 CRITERIA FOR CONFORMITY FOR LABORATORY TESTS**

Sl. No.	CHARACTERISTIC	AVERAGE ( $\bar{X}$ )	RANGE ( $R$ )	CRITERION FOR CONFORMITY
(1)	(2)	(3)	(4)	(5)
i)	Compression parallel to grain	$\bar{X}_1$	$R_1$	$(\bar{X}_1 - 0.4R_1)$ shall be equal to or greater than the specified value
ii)	Static bending	$\bar{X}_2$	$R_2$	$(\bar{X}_2 - 0.4R_2)$ shall be equal to or greater than the specified value
iii)	Moisture content	$\bar{X}_3$	$R_3$	$(\bar{X}_3 + 0.4R_3)$ shall be less than or equal to the specified value

NOTE —  $R$  is to be calculated if the number of test results is less than 10. In case the sample size is 10 or more  $R$ , based on the sub-groups of five samples each, is to be calculated and used in place of  $R$ .

# INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

## Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

## Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 s <sup>-1</sup>
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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**AMENDMENT NO. 1      JULY 1978**  
**TO**  
**IS : 10 ( Part III )-1974 SPECIFICATION FOR**  
**PLYWOOD TEA-CHEST**

**PART III BATTENS**

*( Fourth Revision )*

**Alterations**

( Page 4, clause 2.1, line 1 ) — Substitute ' IS : 707-1976\* ' for ' IS : 707-1968\* '.

( Page 4, Note under clause 3.1 ) — Delete.

( Page 4, clause 4.1.1, line 1 ) — Substitute '[ see IS : 10 ( Part I )-1976† ] ' for ' ( see IS : 10-1970† ) '.

( Page 4, foot-notes with marks ' \* ' and ' † ' ) — Substitute the following for the existing foot-notes:

' \*Glossary of terms applicable to timber technology and utilization ( second revision ).

†Specification for plywood tea-chests: Part I General ( fourth revision ). '

( Page 5, clause 4.1.1.1, line 1 ) — Substitute ' IS : 10 ( Part I )-1976\* ' for ' IS : 10-1970\* '.

( Page 5, foot-note with mark ' \* ' ) — Substitute the following for the existing foot-note:

' \*Specification for plywood tea-chests: Part I General ( fourth revision ). '

( Page 6, clause 5.1.1.2 ) — Substitute the following for the existing clause:

' 5.1.1.2 *Insect holes* — Live insect holes shall not be permitted. Dead insect holes may be permitted up to a maximum of four per batten provided these are only pin holes ( that is, maximum dia 2 mm ) and provided these are well scattered such that these do not impair the strength of the batten. '

( Page 6, clause 6.1, last sentence ) — Substitute the following for the existing sentence:

' However, for tea-chests of any size used for packing instant tea, all the battens may be finished with square ends and with chamfered edges. '



( Page 9, Table 1, heading of col 4 ) — Substitute the following for the existing heading:

**‘SUB-SAMPLE FOR MOISTURE CONTENT’**

( Page 10, clause B-3.2 ) — Substitute the following for the existing clause:

**‘B-3.2 Test for Moisture Content** — The number of battens to be tested for moisture content ( 5.1.2 ) is given in col 4 of Table 1. These shall be taken at random from those inspected under B-3.1 and found conforming to visual and dimensional requirements.’

( Page 10, clause B-3.2.1 ) — Substitute the following for the existing clause:

**‘B-3.2.1** The individual test results for each batten shall be noted and from these test results, the average ( $\bar{X}$ ) and the range ( $R$ ) shall be calculated as follows:

$$\text{Average } (\bar{X}) = \frac{\text{The sum of test results}}{\text{Number of test results}}$$

$$\text{Range } (R) = \text{The difference between the maximum and the minimum values of the test results.}^{\ast}$$

( Page 10, Table 2 ) — Delete.

### **Addenda**

( Page 6, clause 7 ) — Add the following new clause after clause 7 and renumber clauses ‘7.1 and 7.2’ as ‘7.1.1 and 7.1.2’, respectively:

**‘7.1 Type Test** — For the determination of the suitability of species of timber, tests given under 7.1.1 and 7.1.2 shall be carried out. However, once the suitability and identity of a species is established, further testing of battens, manufactured from the same species in a particular lot, for these two requirements may not be necessary.

**NOTE** — However, in case where battens are being manufactured and supplied regularly, these tests shall be conducted periodically at least twice in a year.’

( Pages 7 and 8, Appendix A ) — Add mark ‘†’ against the species mentioned at Sl No. 1, 2, 4, 5, 7, 11, 15, 16, 19, 20, 23, 24, 27, 28, 30, 33, 40, 42, 43, 45, 46, 47, 48, 49, 50 and 51.

( Page 8, foot-note ) — Add the following new foot-note after the existing foot-note:

**‘†Species generally recommended for battens for tea-chests for export purposes.’**

(Page 10, clause B-3.2.1) — Add the following new clause after B-3.2.1:

**B-3.2.2** A lot shall be declared conforming to the requirements of moisture content only if the value of the expression  $(\bar{X} + 0.4 R)$  is less than or equal to the specified value.

**NOTE** —  $R$  is to be calculated if the number of test results is less than 10. In case the sample size is 10 or more,  $\bar{R}$  based on the sub-groups of five samples each, is to be calculated and used in place of  $R$ .

(BDC 20)

**AMENDMENT NO. 2     JULY 1980**  
**TO**  
**IS : 10 ( Part III )-1974 SPECIFICATION FOR**  
**PLYWOOD TEA-CHEST**  
**PART III BATTENS**  
**( Fourth Revision )**

**Alterations**

[ Page 6, clause 7.1 ( renumbered as clause 7.1.1 ) ( see also Amendment No. 1 ), line 3 ] — Substitute  $\frac{3.5 \times 10^4}{l}$  for  $\frac{4 \times 10^4}{l}$ .

[ Page 6, clause 7.2 ( renumbered as clause 7.1.2 ) ( see also Amendment No. 1 ), line 2 ] — Substitute  $\frac{3.5 \times 10^3}{l}$  for  $\frac{4 \times 10^3}{l}$ .

( BDC 20 )

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TO

**IS : 10 ( Part III ) - 1974   SPECIFICATION FOR  
PLYWOOD TEA-CHEST**

**PART III   BATTENS**

**( *Fourth Revision* )**

**Alterations**

( *Page 6, clause 7.1* ) — Substitute the following for the existing clause:

**‘ 7.1   Compression Parallel to Grain**

**7.1.1** The test shall be carried out in accordance with IS : 1708-1969\* and 7.1.2.

**7.1.2** When tested on full length battens of sizes recommended in 4.1 with the ends properly squared, the maximum compressive load shall be not less than  $\frac{3.5 \times 10^5}{l} N$  where  $l$  is the length of the batten of tea-chest in cm. ’

( *Page 6, clause 7.2* ) — Substitute the following for the existing clause:

**‘ 7.2   Static Bending**

**7.2.1** The test shall be carried out in accordance with IS : 1708-1969\* and 7.2.2.

**7.2.2** When tested on full length batten ( *see 4.1* ) under central load on 1-4 cm span, the breaking load shall be not less than  $\frac{3.5 \times 10^4}{l} N$  where  $l$  is the length of batten of tea-chest in cm. ’